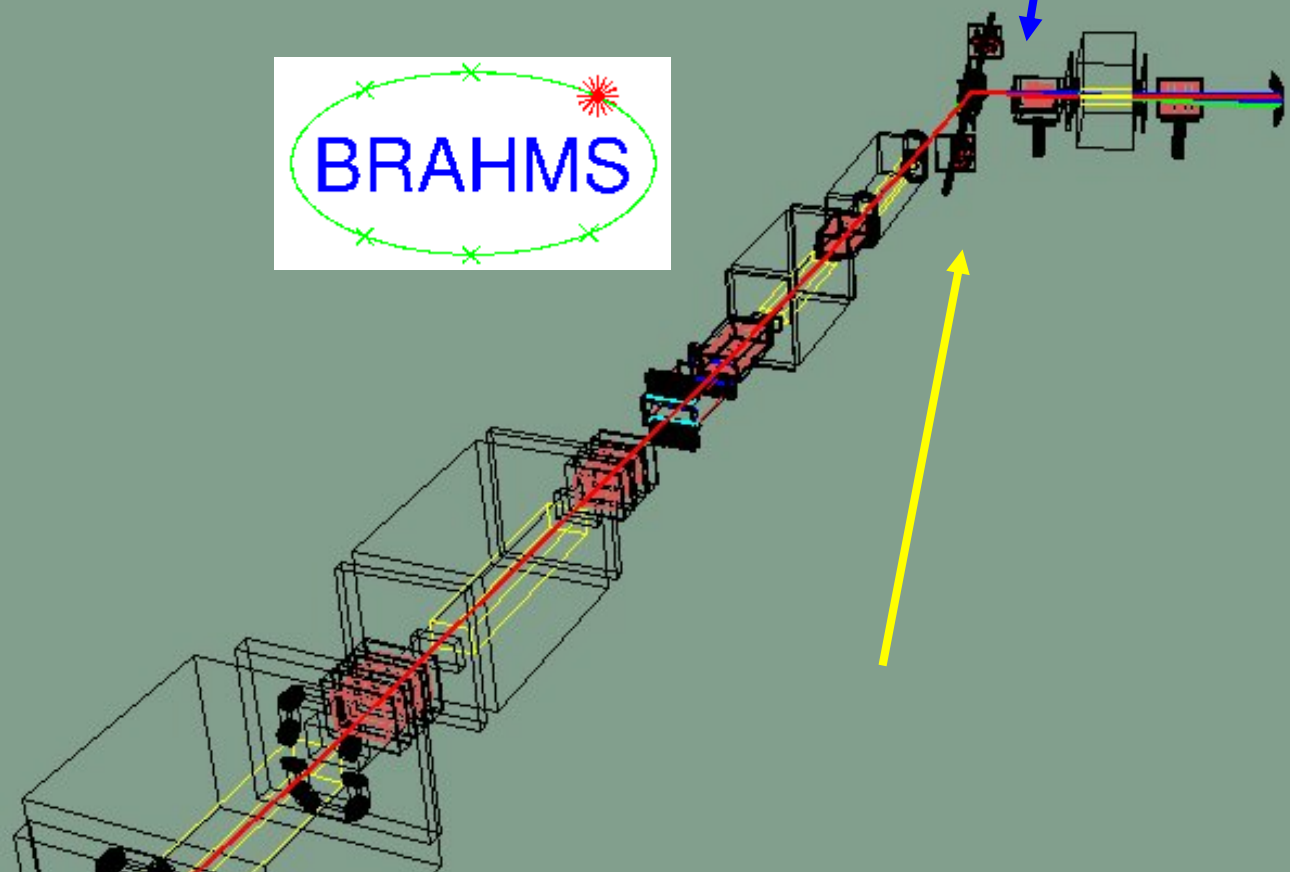


# BRAHMS 5th

J.H. Lee (BNL)

- BRAHMS in “1 page”
- Data Collection:  
Performance, Luminosity
- Machine Related Issues,  
Comments
- Summary





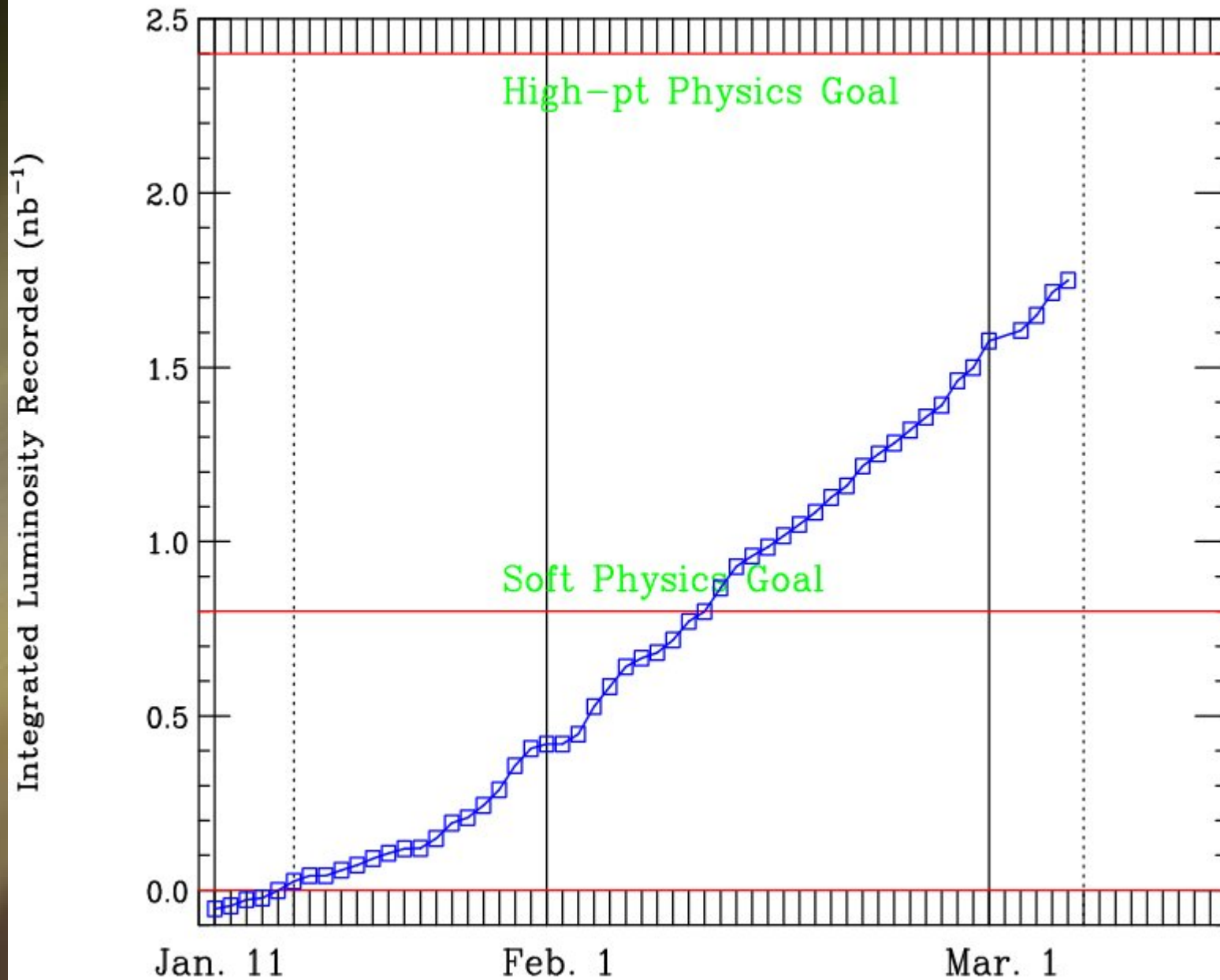
### Braod RAnge Hadron Magnetic Spectrometers

- Designed to study nuclear reactions in broad kinematic range ( $y$ - $p_T$ )
- 2 movable spectrometers with small solid angle measuring charged identified hadrons precisely
- Centrality detectors (Si+Scintillator Tiles) to characterize events
- 53 people from 12 institutions from 5 countries

## BRAHMS Cu+Cu 200 GeV

- DAQ time for Jan. 16- Mar. 8: 430 hours ~9 hours/day
- Data Summary
  - $\sim 1.75 \text{ nb}^{-1}$  Cu+Cu 200 GeV recorded
  - 56M MRS 103M FFS Triggers collected
  - $\sim 75\%$  of the Goal Achieved
  - Data taken for the All angle/field settings planned
- Physics
  - Identified Charged hadron yields in  $0 < y < 3.8$
  - High- $p_T$  Physics at  $y \sim 1, 2, 3$
  - Crossing-Angle scan for SMD done

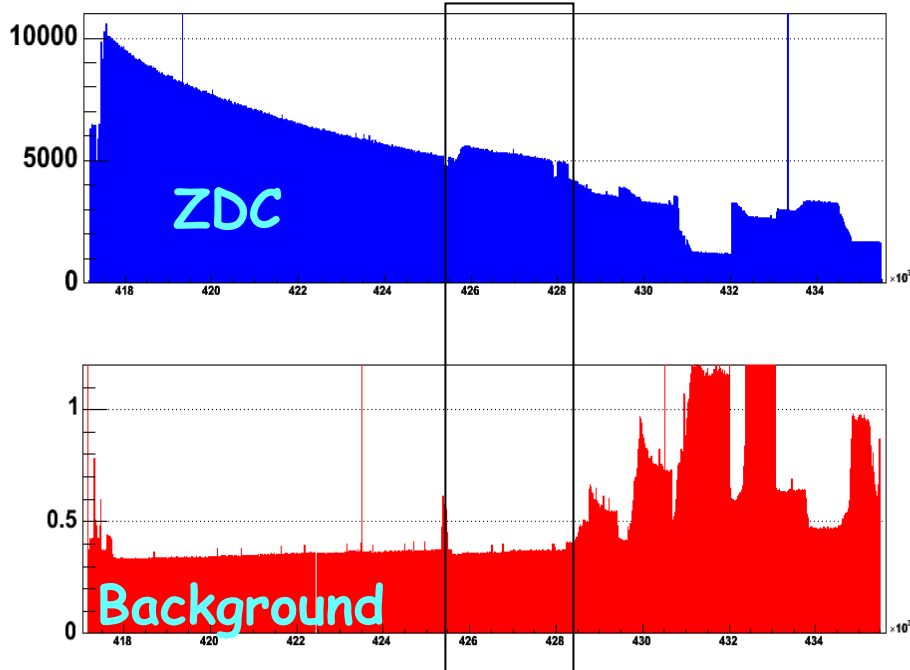
## BRAHMS Run5 Cu+Cu run



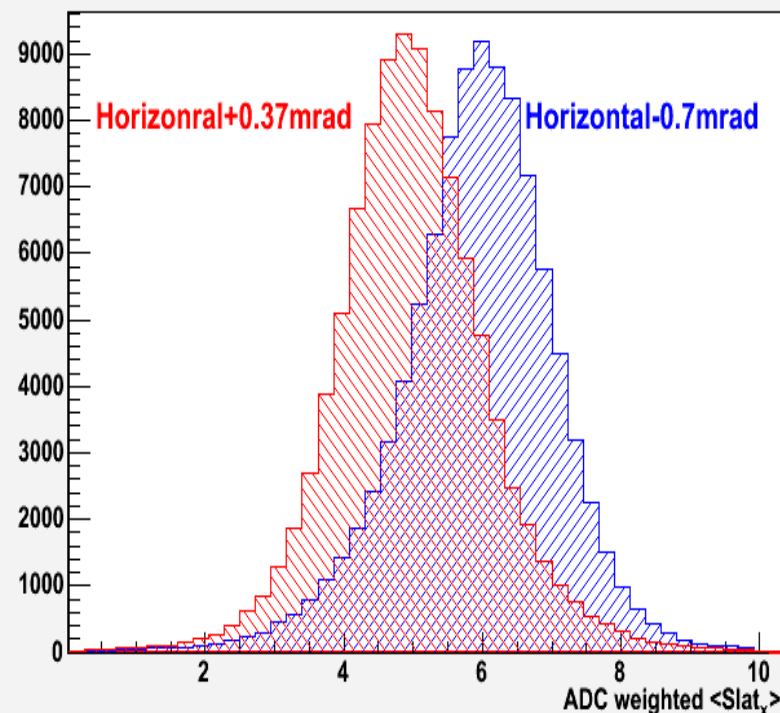
# Crossing Angle Scan

(data taken at the maximum allowed angles)

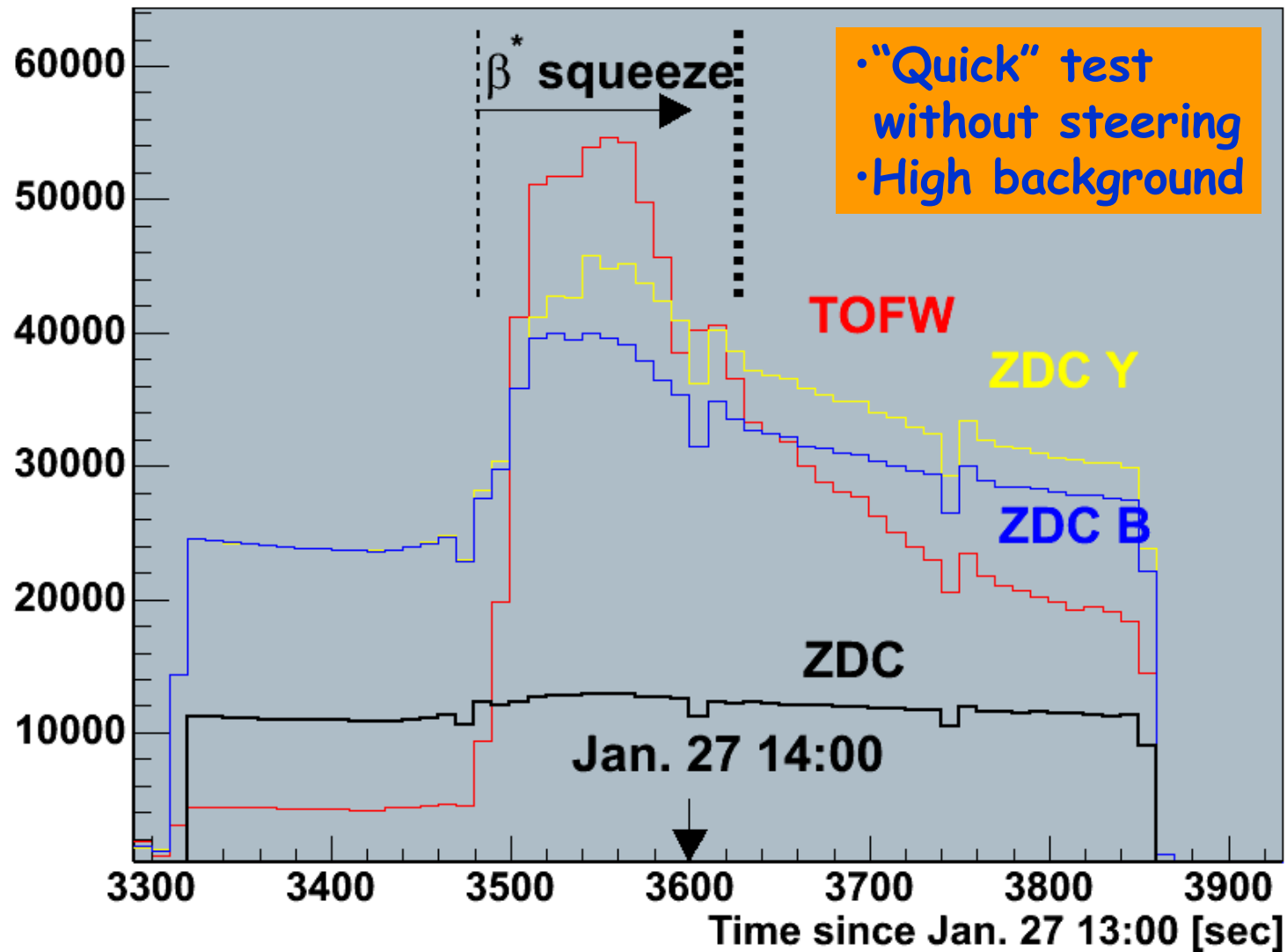
Yellow Horizontal +  
(ZDC~15% increase)



## Blue Beam



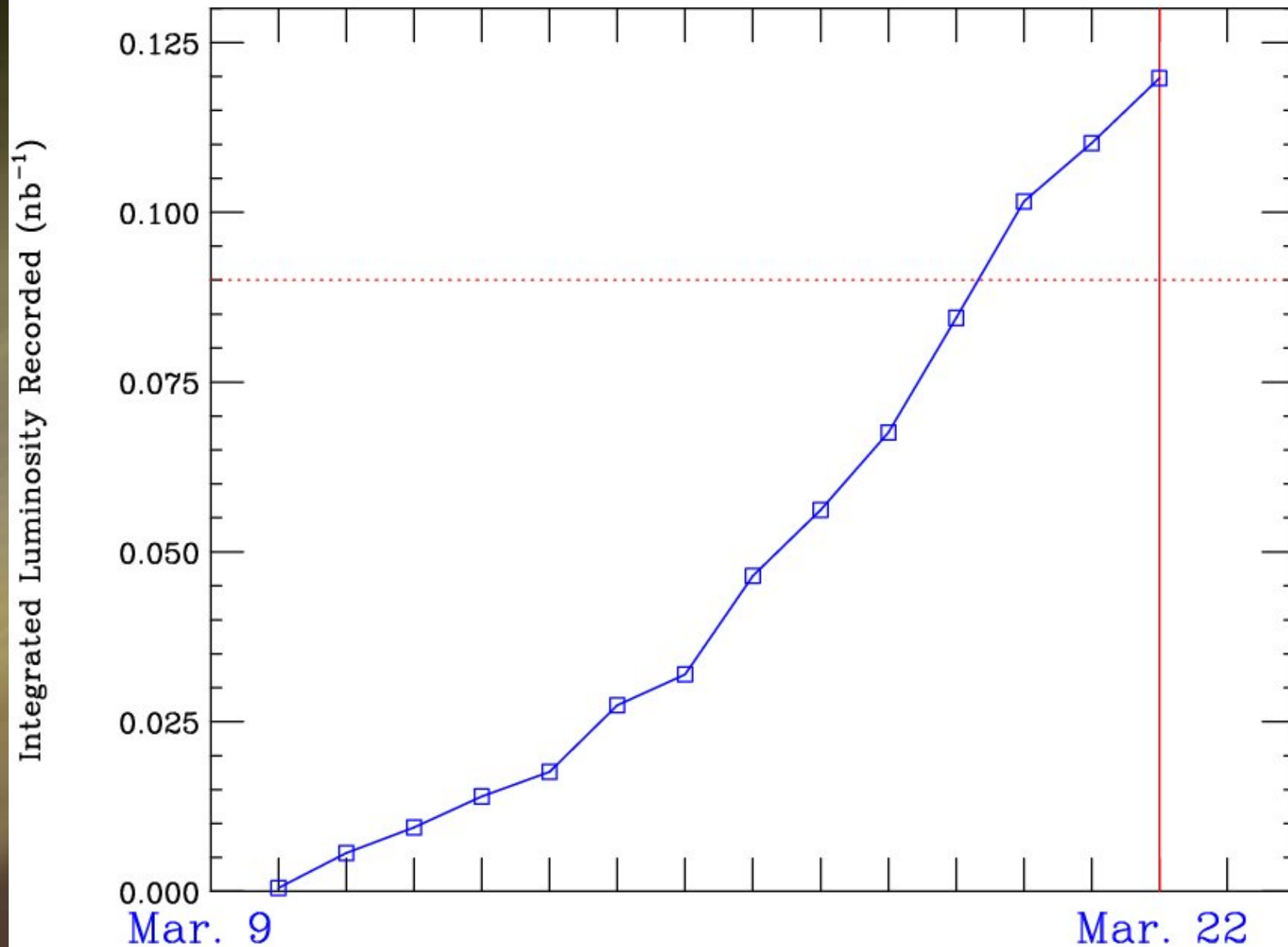
# $\beta^*$ squeeze test: 2.6m $\rightarrow$ 1.8m



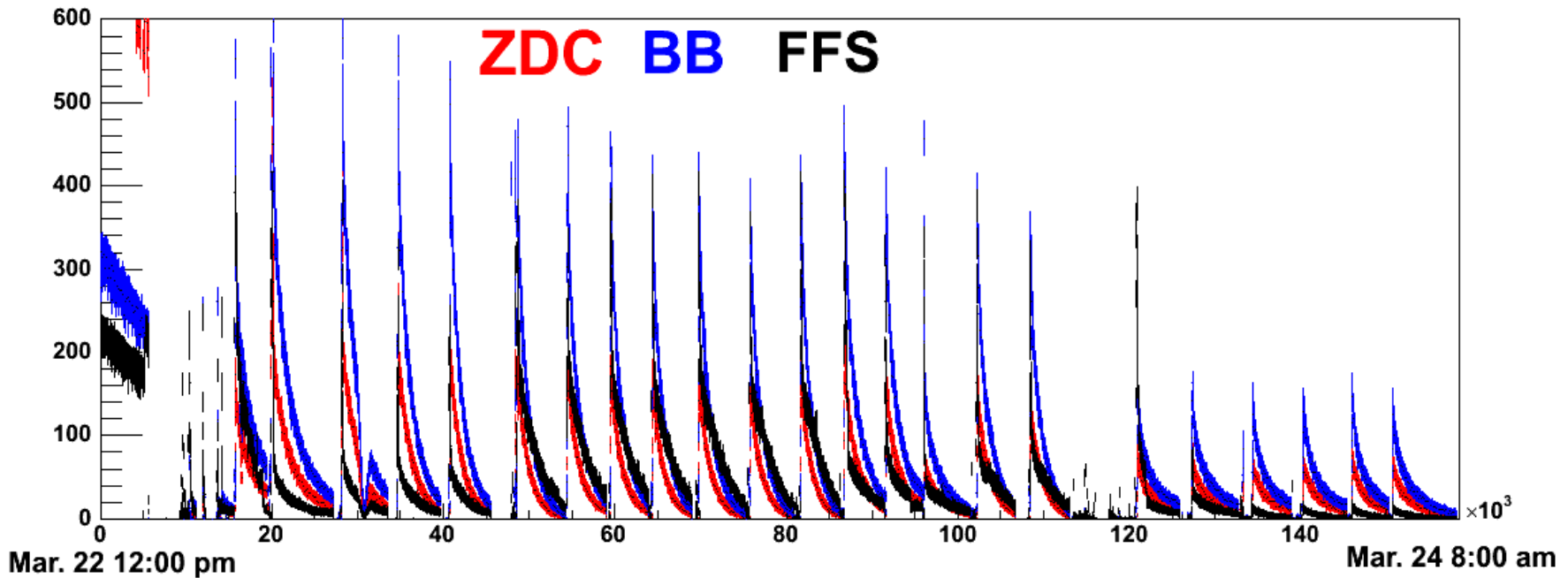
# BRAHMS Cu+Cu 62 GeV

- Data Summary
    - Total  $120\mu\text{b}^{-1}$  Recorded
    - 18M MRS triggers, 5.5M FS triggers collected
    - Achieved the luminosity goal for physics
  - Data collected for the physics as initially planned:
    - Identified Particle Yields in  $0 < y < 3$
    - “High- $p_T$ ” Physics at  $y \sim 1$
- And some more:
- “High- $p_T$ ” Physics at  $y \sim 2$
  - Identified Particle Yields near the beam rapidity ( $y_\pi \sim 3.8$ )

## BRAHMS Run5 62 GeV Cu+Cu run



# BRAHMS Injection Energy Run Summary

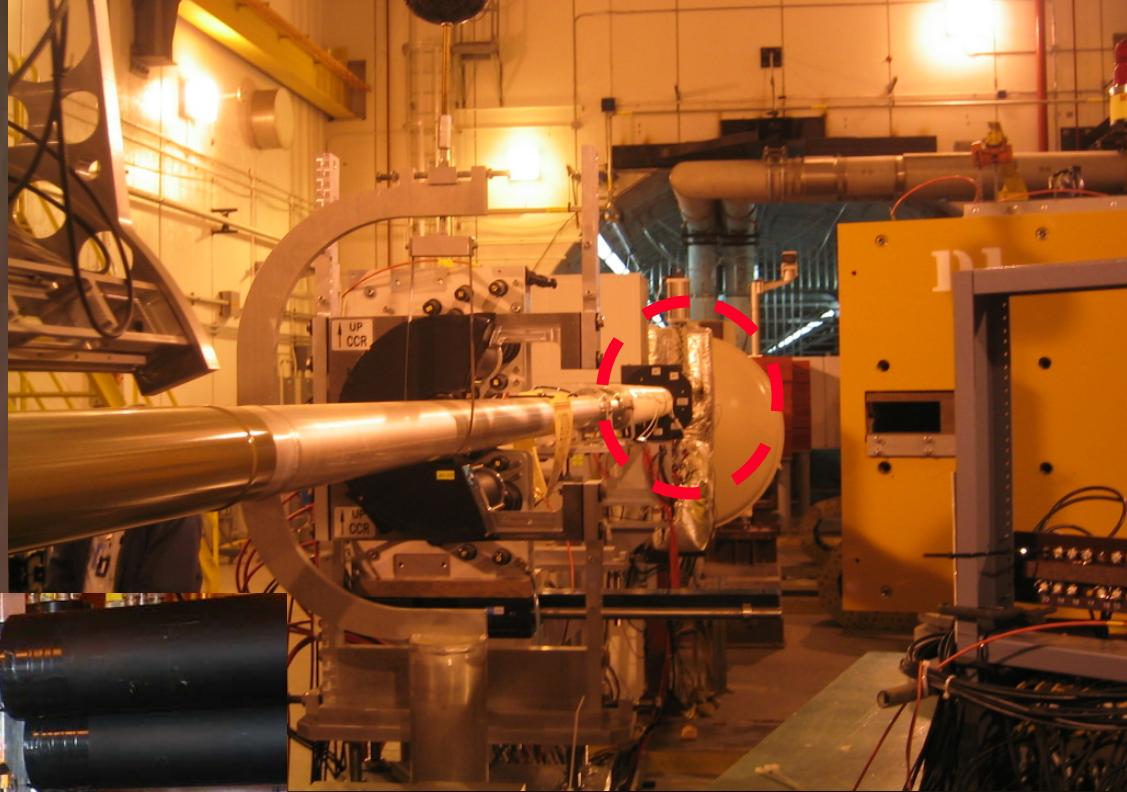


- Total DAQ time: 28 hours  
(22<sup>nd</sup> 4pm - 24<sup>th</sup> 8am): 70% of the Calendar time
- Data collected at selected angles for  $y \sim 0, 1, 2, 3$   
~2M MRS Triggers, ~1.9M FFS Triggers, ~0.35M FS Triggers

# BRAHMS p+p 200 GeV

- **DAQ time** for Apr. 17 - June 14: 560 hours ~10 hours/day (Machine up time for the period ~ 52%)
- **Data Summary**
  - 2 pb<sup>-1</sup> recorded since April 17th
  - 2/2.5 = 80% of goal
- **Main physics goal:** single spin transverse asymmetry at high- $x_F$ 
  - FS at 2.3 deg. at full field setting for  $A_N(\pi^\pm)$ : Done
  - FS 4 deg. at full field for  $A_N(\pi^-)$  at high- $p_T$ (2.5-3.5 GeV/c): Done
  - FS 3+2.3 deg. at full field for  $A_N(\pi^-)$  at high- $x_F$  (0.35-0.45): Done
  - $A_N(K^\pm)$  at 2.3 deg. A/B-pol: ~1.5 Week

## New Min-Bias Counter for pp



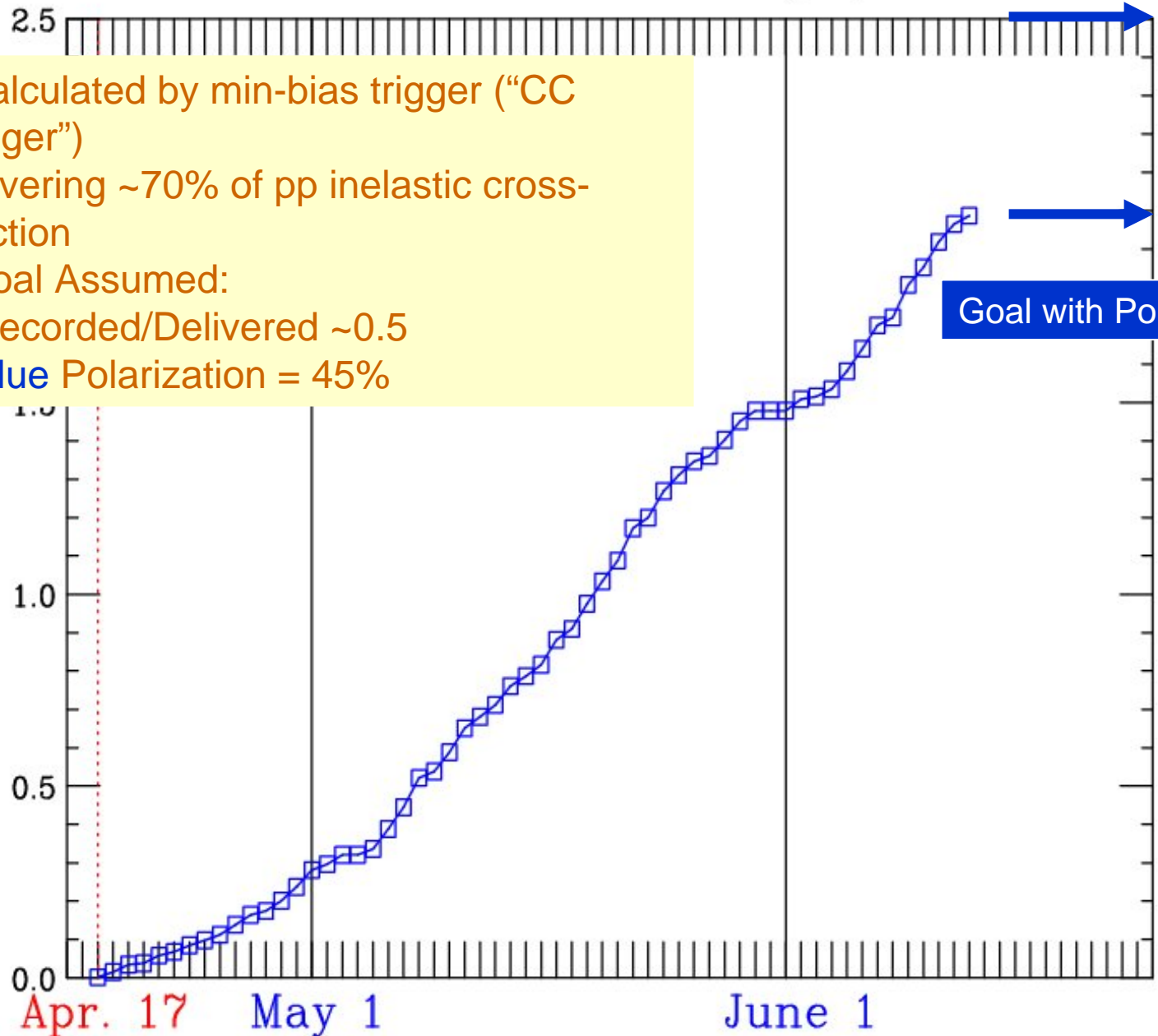
- "CC" Counter - Cherenkov Counter
- Installed for pp05
- Covers ~70% of pp inelastic cross-section
- Vertex resolution  $\sigma \sim 2\text{cm}$

## BRAHMS Run5 200 GeV p+p run

Goal

Integrated Luminosity "Recorded" ( $\text{pb}^{-1}$ )

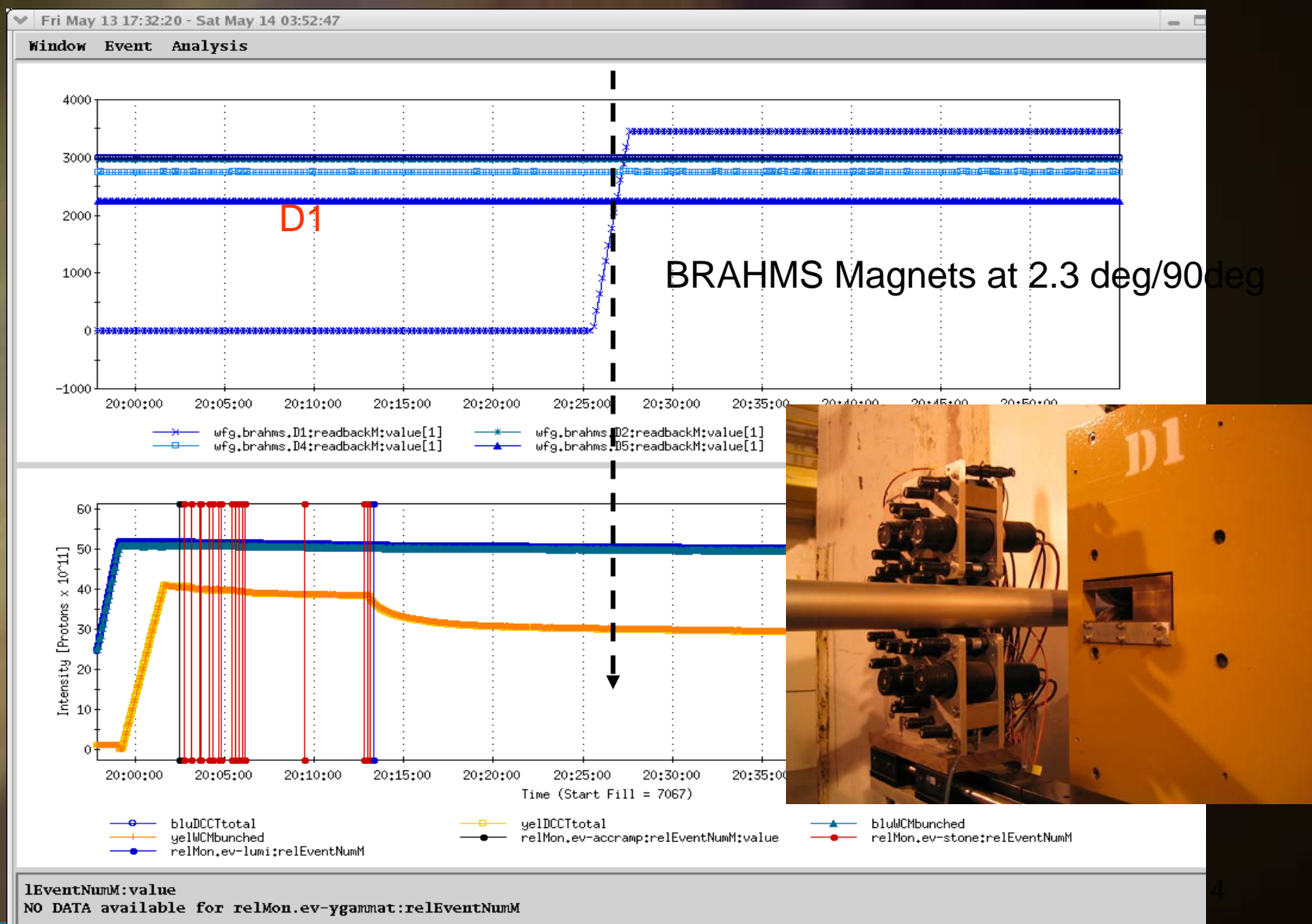
- Calculated by min-bias trigger ("CC trigger") covering  $\sim 70\%$  of pp inelastic cross-section
- Goal Assumed:
  - Recorded/Delivered  $\sim 0.5$
  - Blue Polarization = 45%

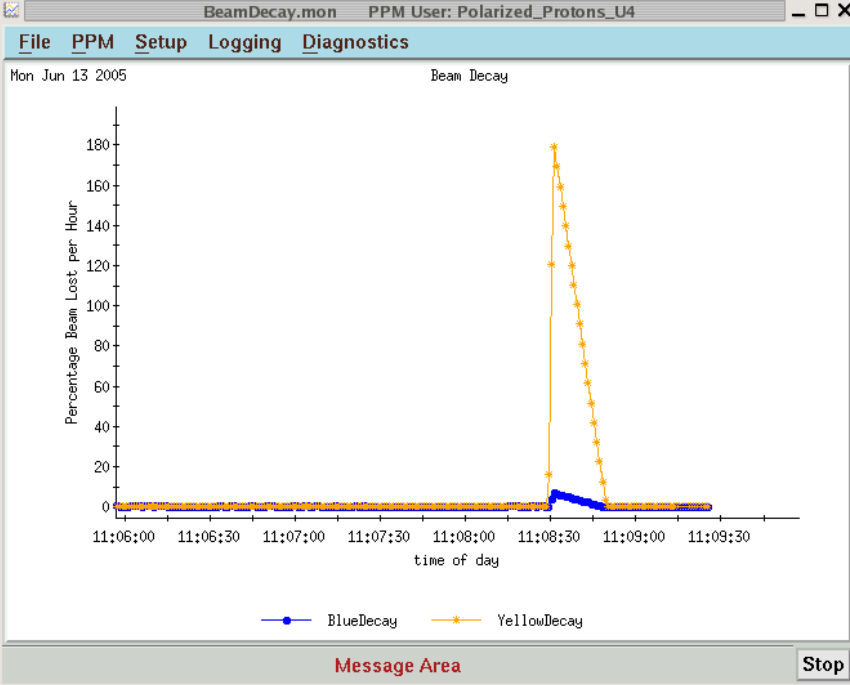


## BRAHMS Magnets and Beam

- BRAHMS is small solid angle spectrometer emphasizing forward rapidities: magnets require to be near the beam pipe with various field settings for physics
- "Small" residual field  $\sim 100\text{Gm}$  from D1, D2 on the orbit at the most forward angle with the full field: Studied and known from TOSCA field simulation since the BRAHMS design
- Extra shielding work has been done last week: reducing fringe field  $\sim \times 10$  smaller. Still an issue?
- Is this a p+p only issue? Will be an issue for the future running? dAu, AuAu?
- Some "best luminosity" at the beginning of the store can not be used for physics due to magnet ramp-up waiting period ( $\sim 10\text{-}40\text{min}$ )
- No effect of the magnet field (controlled) changes on the beam after beam gets stabilized
- During the injection and ramping: small fringe fields are "believed" to have some effect on the beam. Why more sensitive for B-pol.?
- BRAHMS Magnet trip (D1,D2) caused beam aborts may be related to some power distribution
- Some Tests are planned to be done in the next week on the issues

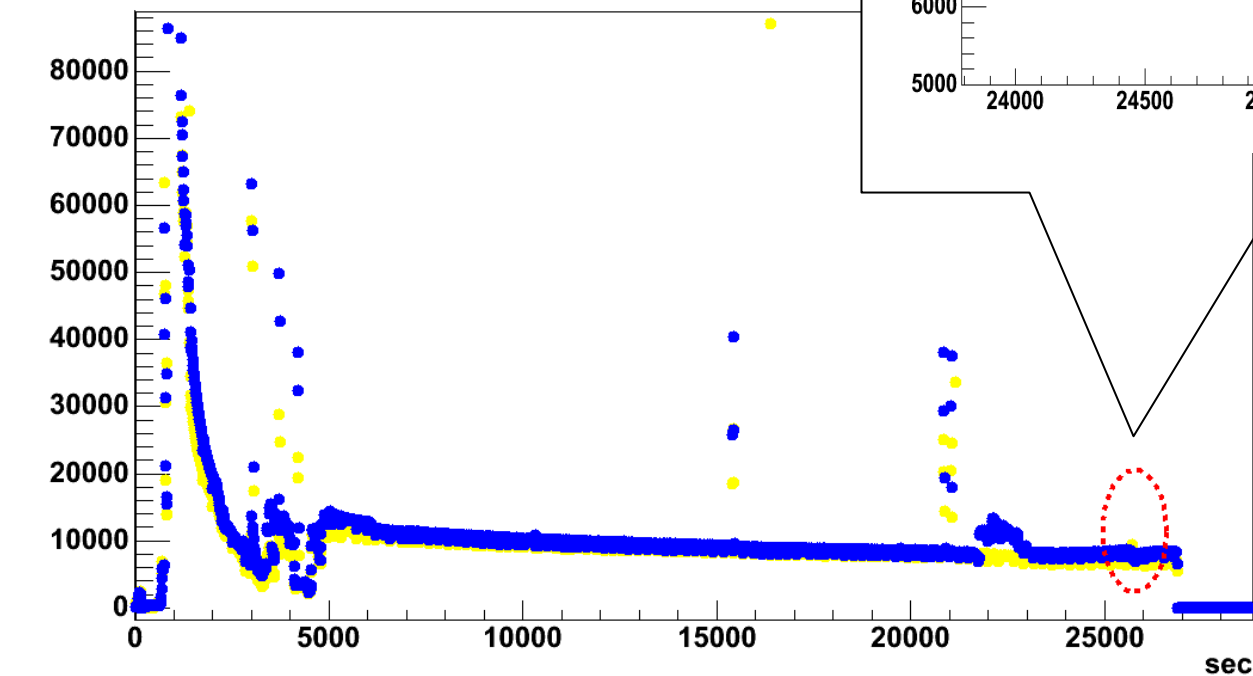
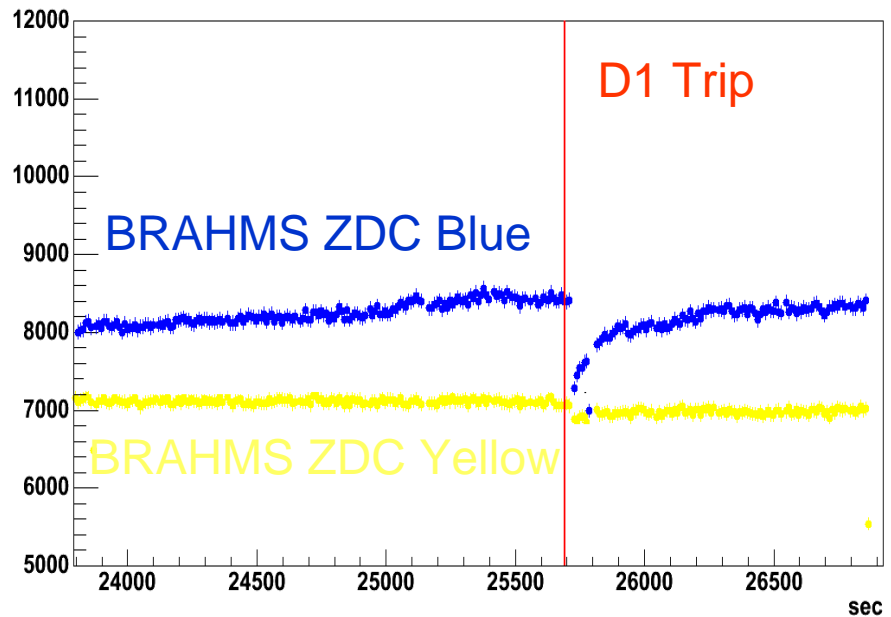
# D1 Magnet and Beam



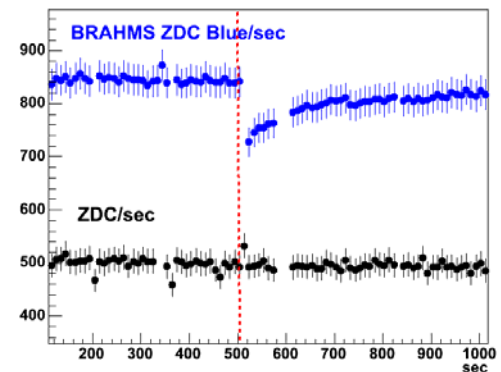


BRAHMS

# BRAHMS Magnet D1 Trip and the Beam



Mon Jun 13 11:00:00 2005  
Mon Jun 13 12:00:00 2005





## Questions Asked 1: Recorded/Delivered

- Recorded/Delivered  $\sim 0.5$  for Run3, Run4, CuCu
- Recorded/Delivered "Physics" for pp05  $\sim 60-65\%$
- Inefficiency
  - DAQ dead time ( $\sim 20-30\%$ )
  - Detector down time + run set up time + pol. measurements +
    - New for pp05: Magnet ramp-up permission waiting (10-40 min.)
- BRAHMS can safely run through a controlled beam dump

## Questions Asked 3: Maintenance / Communication

- Most of the unscheduled access by BRAHMS: ~15 min.: minimal disturbance to the machine schedule and crucial/great benefit for the experiment
- Support Beam Exp + Maintenance - "clustering disturbance"
- 2 weeks -> 3 weeks maintenance: Beginning of the run -> stable production run?
- Very useful to have "Plan for the Day" page by scheduling physicist describing short term machine schedules: Machine development, Access, Special Beam conditions, Issues,....
- More clear communication desired for polarization measurements (through BERT?)

## Questions Asked 2: High Luminosity/Background

- BRAHMS high- $p_T$ /high- $x_F$  physics with current detector set-up is beam limited
- Can utilize "enhanced" luminosity (x2-4)
- No significant background issues with the currently available luminosity
- Some hints of background issues at the beginning of stores with pressure rise: Luminosity or/and beam tune? Need more study.



## BRAHMS 5<sup>th</sup>: Summary

- Successful and Productive running
  - Thanks to the **Great Machine Performance**,  
**Good Data Sets** in hand, **Exciting Physics** being produced
  - BRAHMS can take "enhanced" luminosity
  - Some open Issues
    - Pressure rise/background issues at the beginning of the store with high luminosity?
    - D1,D2 vs. Beam: more shielding, isolating PS?
- Will be an issue for dAu, AuAu?
- Beam Crossing angle at BRAHMS?
- 
- **THANK YOU!** for providing **Great Luminosity and the Support**
  - Hope to see you for BRAHMS 6<sup>th</sup>